

WHAT IS CLAIMED IS:

1. A hybrid multi-user interference cancellation method for canceling interference between a plurality of user signals, comprising:

5 (a) receiving a plurality of external user signals, calculating powers of the user signals, and providing user numbers to the calculated signal powers in

their intensity orders;

(b) sorting the user numbers in descending order;

10 (c) forming at least one user cluster so that the signal powers following the sorted user numbers may differ less from a central value or a mean value in the same cluster; and

(d) performing parallel interference cancellation on the respective user signals within the same cluster, and performing successive interference cancellation between the formed clusters.

2. The method of claim 1, wherein (c) comprises:

15 configuring a trellis including nodes and branches, the sorted user numbers being provided to the nodes; and

forming at least one user cluster including at least one user number from a start node to an arrival node moving along the branches of the trellis.

20 3. The method of claim 2, wherein forming at least one user cluster comprises: forming the user numbers of from the user number generated by adding 1 to the user number provided to the start node to the user number provided to the arrival node, into a single cluster.

4. The method of claim 3, wherein (c) comprises:

calculating an average signal power of the formed user clusters to

define an object function of each branch;

calculating the sum of all object functions received from at least one path for each branch, by the branches that have met at a predetermined node;

selecting the branch with the least sum of the calculated object functions as the optimal path; and

5 collecting the numbers provided to the respective nodes in the selected optimal path to form a user cluster.

5. The method of claim 4, wherein the defined object function satisfies the subsequent equation

$$10 J_e = \sum_{i=1}^K \sum_{x \in s_i} \|x - m_i\|^2$$

where s_i is a number of user sets, and m_i is a mean signal power value in the user set.

6. The method of claim 1, wherein (c) comprises:

15 configuring a trellis including nodes and branches, the sorted user numbers being provided to the nodes; and

forming at least one user cluster that includes no user numbers from a start node to an arrival node moving along the branches of the trellis.

7. The method of claim 6, wherein (c) comprises:

excluding the user cluster without user numbers, when selecting the optimal path by using the formed user cluster.

20 8. A hybrid multi-user interference canceller for canceling interference between a plurality of user signals, comprising:

a channel estimator for receiving a plurality of external user signals,

calculating powers of the user signals, and numbering the calculated signal powers in their intensity orders;

a sorter for sorting the user numbers in descending order;

a cluster calculator/former for forming at least one user cluster so that

5 the signal powers following the sorted user numbers may differ less from a central value or a mean value in the same cluster; and

a hybrid interference canceller for performing parallel interference cancellation on the respective user signals within the same cluster, and performing successive interference cancellation between the formed clusters.

10 9. The canceller of claim 8, wherein the cluster calculator/former configures a trellis including nodes and branches, the sorted user numbers being provided to the nodes; and forms at least one user cluster including at least one user number from a start node to an arrival node moving along the branches of the trellis.

15 10. The canceller of claim 9, wherein the cluster calculator/former forms the user numbers of from the user number generated by adding 1 to the user number provided to the start node to the user number provided to the arrival node, into a single cluster.

20 11. The canceller of claim 10, wherein the cluster calculator/former calculates an average signal power of the formed user clusters to define an object function of each branch, and allows the branches that have met on a predetermined node to calculate the sum of all the object functions provided from at least one path for each branch.

12. The canceller of claim 11, wherein the cluster calculator/former

selects the branch with the least sum of the calculated object functions as the optimal path, and collects the numbers provided to the respective nodes in the selected optimal path to form a user cluster.

13. The canceller of claim 8, wherein the cluster calculator/former
5 configures a trellis including nodes and branches, the sorted user numbers being provided to the nodes, and forms at least one user cluster that includes no user numbers from a start node to an arrival node moving along the branches of the trellis.

14. The canceller of claim 13, wherein the cluster calculator/former
10 excludes the user cluster without user numbers, when selecting the optimal path by using the formed user cluster.

15. A recording medium including a hybrid multi-user interference cancellation method for canceling interference between a plurality of user signals, comprising:

15 (a) receiving a plurality of external user signals, calculating powers of the user signals, and numbering the calculated signal powers in their intensity orders;

(b) sorting the user numbers in descending order;

20 (c) forming at least one user cluster so that the signal powers following the sorted user numbers may differ less from a central value or a mean value in the same cluster; and

(d) performing parallel interference cancellation on the respective user signals within the same cluster, and performing successive interference cancellation between the formed clusters.